Strictly speaking, measure includes weight, which is the measure of the gravitation of bodies towards the centre of gravity. And measures of capacity also are almost universally derived, not from their cubical dimensions, but from the weight of pure water contained in them under determinate conditions as to temperature and atmospheric pressure.

The measure of temperature is based upon the observed rate of linear expansion by heat of a body selected for this purpose, generally mercury, taking as constant units the temperature of melting snow or ice, and of water boiling under determinate atmospheric pressure.

In defining measure, it should be added that it is also applied to the measure, or (as it is termed) *admeasurement* of the tonnage of ships, being a determination of the weight a ship is capable of carrying, with relation to its measure of cubic capacity; to value in relation to a monetary unit; to time and duration in relation to the unit of a mean solar day or a second, its 86,400th part; to velocity, by combining the measure of extension with that of time or duration; to mechanical work, the unit of which is a horse power, as it is commonly termed, or more properly the power of raising 33,000 lbs. one foot in one minute, thus combining the measures of linear extension, weight, and time; to angles, the unit being a degree or the 360th part of a circle described from the point of junction of the two straight diverging lines forming the angle; &c. &c. It is not, however, proposed here to refer further to these measures or to the scientific questions connected with them.

The measure of volume, or bulk of a body, as compared with that of another body differing in volume but equal in weight, is shown by its density, and is also expressed in terms of a fixed standard unit. The densities of bodies are in the direct ratios of their masses, or quantity of matter, and in the inverse ratios of their volume.

The density of a body is defined to be the mass contained in a unit of volume, when referred to a uniform standard. The specific density is to be distinguished from its specific gravity, which shows its weight in relation to its volume, also when referred to a uniform standard. The specific gravity of a body is defined to be the *weight* of a unit of its volume.

The specific gravity of a body is the quotient of its density when divided by the density of that substance which is considered as unity. Pure water is generally adopted as such unity. But since both these densities vary with the temperature—because the same invariable quantity of matter which the body contains is always distributed over its whole volume, and this is variable with the temperature; so that, generally speaking (with some exceptions, pure water, for instance, at certain temperatures), the body, at a higher temperature, has less density than at a lower temperarure—we must fix a certain temperature at which the body, as well as the water, must be considered. It is not necessary that this fixed temperature should be the same for the body and the water, its choice for both being quite arbitrary.

For bodies the most convenient standard temperature for expressing their density seems to be that of one of the fixed points of the thermometer; and the temperature of melting ice or snow (32° F. or 0° C.) is generally adopted. For pure water, there is a maximum of density which occurs at nearly 39° F. or 4° C., and this maximum density of pure water is generally adopted as the unit of density.

The sign $\triangle$ prefixed to the symbol of any weight, with its numerical value following, denotes the ratio of the density of the weight at the temperature of melting snow to the maximum density of pure water.

The relation of the bulk or volume of a body to its weight is expressed both by its density and its specific gravity, these terms being often used indiscriminately. But the former term is more strictly applicable to solid bodies, and the latter to liquids and gases.

To ascertain the density of a body, it is requisite that its volume should be determined, as the density cannot be directly found. The actual volume may be determined—

1. Either by cubic measurement, when the form of the body admits of this measurement being actually made; but this occurs but rarely.

2. Or by ascertaining its specific gravity, from determining the difference of its weight when weighed in air and in water. This is the readiest and most accurate mode of determining both its volume and its density, but the immersion of a body in water is not always practicable, or it may be injurious to the body under experiment.

H. W. CHISHOLM

(*To be continued.*)

NOTES

AT the Meeting of the Paris Academy of Sciences, M. Ferdinand de Lesseps was elected an "Academicien libre" in the place of M. de Verneuil, deceased. M. de Lesseps obtained 33 votes; M. Breguet, 24; MM. du Moncel, Jacquemin, and Sedillot 1 each. M. de Lesseps thus obtained 2 votes beyond the absolute majority required to render an election valid, and was therefore declared elected. The number voting, 60, was large.

THE forty-first Annual Meeting of the British Medical Association will be held in King's College, London, on Tuesday, Wednesday, Thursday, and Friday, August 5th, 6th, 7th, and 8th. The President-elect is Sir William Fergusson, Bart., F.R.S. The following are the six sections into which the meeting will be divided, and in each section a very large number of papers is already entered to be read:—Section A, Medicine; B, Surgery; C, Obstetric Medicine; D, Public Medicine; E, Psychology; F, Physiology. The sections will meet in rooms of the College appropriated for the purpose, and the Annual Museum of objects of interest in connection with medicine, surgery, and their allied sciences will be arranged in the Library of the College. The President's address will be delivered at 3 P.M. on August 5, and in the evening the Lord Mayor will hold a reception at the Mansion House. The following public addresses will be delivered:—On August 6, an address on Medicine, by Prof. E. A. Parkes, M.D., F.R.S.; on August 7, an address on Surgery, by Prof. John Wood, F.R.S.; and on August 8, an address on Physiology, by Prof. Burdon Sanderson, F.R.S. The President and Council of the Royal College of Surgeons hold a reception on the evening of August 6, and several excursions have been arranged to take place during the meeting. Altogether, to judge from the programme, the meeting promises to be a very successful one.

THE Royal Archæological Institute commenced its annual session at Exeter, on Tuesday, when the Mayor and Corporation held a reception at noon. The President, the Earl of Devon, thereafter delivered his inaugural address on the advantages of the study of Archæology, and in the afternoon an excursion took place to Rougemont Castle. In the evening, again, the Mayor held a reception in the Albert Museum. The Sectional Meetings commenced yesterday, and several interesting excursions have been arranged. The Sections are, Antiquities, Architecture, and History. One of the most attractive accompaniments of the Exeter meeting is the formation of a temporary Museum and Portrait Gallery.

THE French Association for the Advancement of Science commences its second session at Lyons on August 21, the concluding meeting to be held on August 28. As was the case at Bordeaux, there will be General Meetings, Meetings of Sections or Groups, Scientific Excursions, and Public Lectures. A large number of papers has already been entered to be read at the Sectional Meetings, by well-known scientific men, and several interesting excursions have been planned, including one to the famous pre-historic station at Solutré. So far, this year's meeting of the Association promises to be very successful. Immediately after the session of the Association is concluded, the Geological Society of France holds its annual meeting at Roanne.

DR. GÖPPERT, of Breslau, the veteran writer on the subject of fossil plants, is desirous of disposing of his immense collection, in securing which he has spent more than thirty years, and made it perhaps the finest in the world, embracing, as it does, type specimens of 94 different works and 400 minor essays, represented on about 1,000 plates. The number of specimens exceeds 11,000, and includes Sigillaria from sixteen to twenty feet in length, and other specimens of equal magnitude. There are also 200 specimens of different kinds of amber with their inclosed plants, and also a series of diamonds, with various objects included in them. In addition to the fossil objects there is also a very large collection of recent plants, which serves to illustrate the first-mentioned series, such as palms, tree-ferns, cycades, bamboo, algæ, sections of wood, fruits, seeds, &c. Numerous original drawings also accompany the collection, which add much to its value.

MR. SMITH gives some very interesting details in the *Daily Telegraph* of his excavations at Nimrod. We think, however, the main result of his expedition is to show the necessity of a more thorough and longer continued exploration of the ruins of Assyria than Mr. Smith has been able to give; and the sooner such an exploration is undertaken, the more fruitful are the results likely to be.

THE *New York Herald* of the 17th inst. publishes a letter from Dr. Petermann, the eminent German geographer, to Dr. Strasnecky, the Secretary of the American Geographical Society. In it he says:—As at the departure of the expedition much stress was laid on its prospect of reaching the North Pole, the public at large, which has no idea of the difficulties surrounding the solution of geographical problems, might look upon it as a complete failure. It should not be made a reproach to Captain Hall that he held out such a prospect, for without it he would not probably have obtained either ship or money, or any other support. Placed in a similar condition, the same thing has happened to me and my friends in Germany, and it will always remain thus as long as the civilised Governments of the world devote their millions principally to the increase of their armies, and the scientific objects only figure in the Budget for the crumbs, and as long as people who are willing to add to the little knowledge we have of our own earth have to go begging for small contributions. To me the geographical results of the expedition appear of an extraordinary value. At any rate they are the highest that any vessel among the numerous expeditions of all nations to the North and South Poles have ever accomplished for many centuries. I shall speak of the subject at greater length in my next Arctic report (No. 80).

AT the commencement of 1874, says the *Deutsche Zeitung*, one or two ships of the German navy are to be sent on a scientific mission to observe the transit of Venus. These vessels will have to submit their observations, which are to be extended to ocean currents and tides, to the hydrographic office of the German Admiralty.

THE first three numbers of a work on indigenous and exotic Lepidoptera have been issued by Mr. Hermann Strecker, of Reading, Pennsylvania, U.S. the object of the author being principally to bring to the cognizance of the public the many new species from all parts of the world embraced in his very extensive cabinet. While the preference will be given to those from North America, he, unlike Mr. William H. Edwards, includes some species from other countries. The illustrations, which occupy one plate for each number, are all drawn, printed, and coloured by Mr. Strecker himself in the intervals of his daily labours, and the whole work is extremely creditable to him. The work is in quarto, and it is proposed to publish one number every two months, each with a single plate, crowded as fully as possible with figures. The enterprise is well worthy of commendation, and persons desirous of obtaining the work can do so by addressing Mr. Strecker, as above. A few copies only are printed, and the drawings then erased to make way for a new set.

PROF. MEEK announces the existence of primordial species among the fossils collected by Dr. Hayden, in 1872, from near Gallatin City, Montana, U.S.—a very important geological fact. He has also found carboniferous fossils in various localities. Some of these are from the "divide" between Ross's Fork and Lincoln Valley, Montana, embracing many of the same species as occur in the noted Spurgen Hill locality, in Indiana, of the age of the St. Louis limestone.

AT noon of July 8 Prof. Agassiz formally opened the Anderson School of Natural History on Penikese Island, thus bringing to a practical beginning the great idea of a summer school of natural science as first suggested by Prof. Shaler. Our readers are sufficiently familiar with the details of the circumstances which led to the establishment of this magnificent educational enterprise—first, the donation by Mr. John Anderson, of New York, of Penikese Island, one of the Elizabeth group, situated at the entrance of Buzzard's Bay, and valued at 100,000 dollars; then his endowment of it in the sum of 50,000 dollars to meet the current expenses; and subsequently the presentation to the professor by Mr. Galloupe, of Swampscot, of a yacht worth 20,000 dollars, for use in deep-sea dredgings and other explorations in connection with the school. In a circular Prof. Agassiz gives notice to the public that the island affords no accommodation to strangers, and that no guests can be received excepting those who have been accepted as members of the school. The limit of fifty has long since been made up, one-third of them being ladies, while more than a hundred have been rejected in consequence of the limitation. A caterer has been engaged, who will provide for the table, and keep the rooms in order. There is to be no charge whatever for tuition, and as the dormitories have been built at the expense of the fund, no rent will be charged beyond a percentage of the value of the bed-room furniture. The board is to be charged at cost. Should any persons desire to make collections of specimens to carry away with them, cans and alcohol will be furnished at cost to those who are not already provided.

THE Russian astronomers have decided upon occupying twenty-four stations on the important occasion of observing the Transit of Venus. It is found that the weather will probably be highly favourable to astronomical observation at all the stations in Siberia and on the Pacific coast, as there is an average of only three cloudy days in the month of December in these parts of the Russian possessions. The extreme cold of November is well regarded as an almost insuperable hinderance to the proposed work. The following very complete outfit has been ordered for use on this occasion, viz., three heliometers and three photoheliographs, for use in measuring the position of the planet on its passage across the sun's disc; ten equatorials, for observing the apparent contacts of the limbs of the planet and sun by the use of the spectroscopic method, and for the determination of the same moments by observations with the filar micrometer; ten telescopes, for simply observing the instant of each contact; and besides these, there is for each station a complete outfit of clocks, chronometers, and instruments for determining the local time. The observers are all to practise beforehand at the Imperial Central Observatory at Pultowa. The geographical positions of those stations at which the observations result successfully will be afterwards determined by a special geographical expedition by the Russian navy. To perfect this portion of the work, a line of telegraph will be built through Siberia to Nicolaevsk.

WE have received the programme for Session 1873-74 of the University of Durham College of Physical Science, at Newcastle-on-Tyne. It contains ample information as to the amount and kind of instruction to be obtained at the Newcastle College, and full details as to the arrangements, fees, examinations, exhibitions, and scholarships. There are three exhibitions of 15*l.* each to be awarded after examination in October, one scholarship, the T. Y. Hall scholarship, of 20*l*, yearly value, tenable for three years, and two scholarships offered by Mr. Hugh Taylor, consisting of the expense for maintenance and education at the Newcastle College, for two years: those last are for sons of overmen, deputies, or pitmen, who are engaged in coal mines in the counties of Northumberland or Durham, and are between sixteen and eighteen years of age. So far as it goes, the Newcastle College seems to furnish a thorough training in scientific knowledge and method.

WE have received from Mr. F. Abbott a paper read before the Royal Society of Tasmania, giving the result of his recent observations at the Private Observatory, Hobart Town, Tasmania, of η Argus. He thus summarises the results of his most recent observations. In the eye draft of the object η Argus, Feb. 1873, the principal stars appear to have retained their relative position as shown in the drawing of last year. The dark spaces are extending and becoming more undefined, gradually filling up with small stars, fully half as many again as shown in last year's drawing; the whole field of the telescope when directed to η is studded with stars from the 7th to the 12th magnitude, too numerous to count. I have on the present occasion omitted to make a drawing of the object, as in all probability before long photography will be applied both to this and other portions of the dense Nebula between it and κ Crucis—a thing much required.

A MAGNIFICENT work, in the shape of a Photographic Album of Ethnology ("Anthropologisch-Ethnologisches Album"), from the collections of the Berlin Anthropological Society, is about to be published in parts, by Wiegandt and Hempel, of Berlin, the photographs by C. Dammann, of Hamburg. Each part will contain five leaves 48 centimetres in length by 64 centimetres in breadth, each part in a separate portfolio. The contents will be arranged in tables containing from ten to twenty photographs each, and the price of each part is twelve thalers. The first part contains two tables illustrative of the East Coast of Africa, and three tables for Asia, illustrating Eastern Siberia, Japan, Siam, &c. Appended to each portrait is a brief description indicating the country, particular district, sex, and age of the original. The immense value of such a work to ethnologists is evident.

FROM the "Report of the Radcliffe Observer to the Board of Trustees," we see that a considerable amount of regular observatory work has been done during the past year, and that the establishment is in good condition.

IN a letter to the *British Medical Journal*, Mr. J. C. Galton refers to a specimen of a human heart in which the "moderator band" recently found by Prof. Rolleston in the Cassowary, and long known to be well developed in Ruminants as a strong fibrous cord, running in the right ventricle between its outer wall and the septum, is well developed as a thick muscular band. But he remarks that from it "some of the chordæ tendineæ of the tricuspid valve take origin." Prof. Rolleston also considers that one at least of the columnæ carneæ in man, which are unattached in the middle of their course, and are in connection with the musculi papillares of the tricuspid valve, is homologous with it. In the Ruminant, however, the band is quite free and of fibrous structure, and is apparently a much more specialised development than the uncertain muscular cords found in the human heart.

THE report of work contained in the "Proceedings of the Liverpool Naturalist's Field Club for the year 1872-3," appears to us, on the whole, gratifying. The Society made nine field excursions during last summer, and, considering the unsettled state of the weather, these were well attended. The working members of the Society, during these excursions, devote themselves mainly to botanical collecting, though the majority of those who make up the parties spend their time in visiting places of antiquarian and historical interest. Prizes are given for botanical collections, and we are afraid the Society do not take the precaution of urging upon collectors the danger of extirpating the rare plants of the districts visited in their eagerness to make up prize-taking collections. Several evening meetings were held during last winter, at the first of which Mr. Fisher gave a *résumé* of the Botanical gains of the Society during the excursions. The following valuable papers were also read at these meetings:—"On the Respiration and Germination of Plants," by Dr. Carter; "Corals and Coral Islands," by the Rev. H. H. Higgins, President; "On the Intimate Relations between the Animal and Vegetable Kingdoms," by Mr. Chantrell; "On the Sap of Plants, the Physical Causes of its Ascent, and its Composition," by Mr. Davies. We have also received an "Appendix to the Flora of Liverpool," containing a considerable number of additions to that valuable work, which we noticed on its appearance about a year ago.

IT is said that the scheme which has been on foot for some time past, having for its object the closer connection of St. Andrew's University with the neighbouring town of Dundee, by the establishment of an affiliated college there, on the same principle as the Science College at Newcastle is connected with the University of Durham, has fallen through, several of the St. Andrew's professors being of opinion that if this arrangement were entered into it would ultimately end in the University being transferred across the Tay.

THE first four parts of an "Illustrated International Review of the Universal Exhibition of Vienna, 1873," have come to hand. It is a handsome and well-illustrated folio, printed in French, German, and English, and promises to be an "absolutely complete encyclopædia of the Vienna Exhibition of 1873, at once descriptive, artistic, scientific, anecdotic, and biographical." If the prospectus is faithfully carried out, the work will be very valuable both in a scientific and an industrial point of view.

ADVICES to the 12th of June, dated Denver, U.S., make mention of satisfactory progress in the explorations conducted by Professor Hayden and his parties. One of the divisions of the survey at that time was established near Central City, in charge of Mr. Jackson, and consisted of Mr. Coulter as botanist, Mr. Carpenter as naturalist, and Mr. Cole as assistant naturalist. They had already obtained a large collection of plants and zoological objects, having spent two weeks high up in the mountains. Mr. Jackson had made about fifty negatives of the higher peaks, principally in the vicinity of Long's Peak. They expected to proceed shortly to the "Garden of the Gods." Mr. Gardner has been occupied in establishing his base line of triangulation. He has already erected three signal monuments thirty feet high, and twelve miles apart, all of which can be seen from the main range of mountains. One party is at work on Long's

Peak, in charge of Mr. Marvin, accompanied by Mr. Gardner, and another under Mr. Gannett, accompanied by Dr. Peale, as geologist, and Mr. Batty as naturalist. According to the *Denver News*, the cattle, finding these constructions extremely convenient places for scratching, and thinking them apparently erected for their accommodation, have at once commenced appropriating them to that purpose, and evidently with great satisfaction, as it is said that they concentrate in their vicinity for miles around.

"ANNALEN des Physikalischen Centralobservatoriums" is the German title of the record for 1871 of the work done at the great Physical Observatory of St. Petersburg. It is a very thick quarto in Russian and German, and contains full and well-arranged meteorological statistics for fifty-five Russian towns for the year 1871.

THE following are the principal additions to the Brighton Aquarium during the past week:—10 Thornback Rays (*Raia clavata*), 1 Large Tope (*Galeus canis*), 1 Large Smooth Hound (*Mustelus vulgaris*) 3 Three-bearded Rockling (*Motella tricirrata*), 1,000 Sticklebacks (*Gasterosteus spinosus*), 1 fine group of *Actinoloba dianthus* (orange variety); a Smooth Hound (*Mustelus vulgaris*) gave birth to seven young ones, which died immediately, or were born dead.

THE additions to the Zoological Society's Gardens during the past week include two Maugé's Dasyures (*Dasyurus maugæi*) from Australia, presented by Mr. George Heath; a Tytlers Paradoxure (*Paradoxurus tytleri*) from the Andaman Islands, presented by Mr. J. S. Campbell; a Bactrian Camel (*Camelus bactrianus*) from Asia; a Gibbon (*Hylobates* sp. ?); a Crowned Eagle (*Spizaëtus coronatus*) from Senegal; three Blue crowned hanging Parrakeets (*Loriculus galgulus*) from Malacca; an Egyptian Fox (*Canis niloticus*); an Egyptian Vulture (*Neophron percnopteros*), purchased; an Ocelot (*Felis pardalis*) from America; a Hobby (*Hypotriorchis subbuteo*) from this country, and four red-billed Tree Ducks (*Dendrocygna autumnalis*) from America, deposited.

ON THE TEMPERATURE AT WHICH BACTERIA, VIBRIONES, AND THEIR SUPPOSED GERMS ARE KILLED[*]

WHILST a heat of 140° F. (60° C.) appears to be destructive to *Bacteria*, *Vibriones*, and their supposed germs in a neutral saline solution, a heat of 149° or of 158° F. is often necessary to prevent the occurrence of putrefaction in the inoculated fluids when specimens of organic infusions are employed. What is the reason of this difference? Is it owing to the fact that living organisms are enabled to withstand the destructive influence of heat better in such fluids than when immersed in neutral saline solutions? At first sight it might seem that this was the conclusion to be drawn. We must not, however, rest satisfied with mere superficial considerations.

The problem is an interesting one; yet it should be clearly understood that its solution, whatever it may be, cannot in the least affect the validity of the conclusion arrived at in my last paper, viz., that living matter is certainly capable of arising *de novo*. We were enabled to arrive at the conclusion above mentioned regarding Archebiosis by starting with the undoubted fact that a heat of 158° F. reduces to a state of potential death all the *Bacteria*, *Vibriones*, and their supposed germs which an organic infusion may contain. The inquiry upon which I now propose to enter, therefore, touching the degree of heat *below this point* which may suffice to kill such organisms and their supposed germs in an organic infusion, and touching the cause of the delayed putrefaction apt to take place in inoculated organic infusions which have been heated to temperatures above 140° and below 158° F., is one lying altogether outside the chain of fact and inference by which the occurrence of Archebiosis is proved.

It seems to me that the solution of the problems which form the subject of the present communication can only be safely attempted by keeping constantly before our minds two main considerations:—

Thus, in the experiments whose results it is now our object to endeavour to explain, the fluids have been inoculated with a compound consisting partly (*a*) of living units, and partly (*b*) of a drop of a solution of organic matter in a state of molecular change; so that in many cases where putrefaction has been initiated after the inoculating compound has been heated to certain temperatures, there is the possibility that this process of putrefaction may have been induced (in spite of the death of the organisms and their germs) owing to the influence of *b*, the dissolved organic matter of the inoculating compound; that is to say, the heat to which the mixture has been exposed may have been adequate to kill all the living units entering into the inoculating compound, although it may not have been sufficient to prevent its not-living organic matter acting as a ferment upon the infusion.

And there are, I think, the very best reasons for concluding that in all the cases in which turbidity has occurred after the organic mixtures have been subjected to a heat of 140° F. (60° C.) and upwards, this turbidity has been due, not to the survival of the living units, but rather to the fact that the mere dead organic matter of the inoculating compound has acted upon the more unstable organic infusions in a way which it was not able to do upon the boiled saline fluids.

The reasons upon which these conclusions are based are the following:—

1. Because the turbidity which has occurred in inoculated organic infusions that have been subjected to a temperature of 140° F. has always manifested itself appreciably later, and advanced much more slowly than in similar mixtures which had not been heated above 131° F.; whilst it has commenced even later, and progressed still more slowly, when occurring in mixtures previously heated to 149° F. Such facts might be accounted for by the supposition that exposure in these organic fluids to the slightly higher temperature suffices to retard the rate of growth and multiplication of the living units of the inoculating compound, although the facts are equally explicable upon the supposition that the later and less energetic putrefactions are due to the sole influence of the mere organic matter of the inoculating compound.

2. So far as the evidence embodied in the Tables goes, it tends to show that the more unstable different specimens of similar infusions are (that is, the stronger they are), the more rapidly and frequently does late turbidity ensue, and the more this late turbidity approaches, both in time of onset and in rate of increase, to that which occurs when inoculated infusions are not heated to more than 131° F.—when both living and non-living elements of the inoculating compound act conjointly as ferments. Such facts show quite clearly that where the intrinsic or predisposing causes of change are strong, there less potent exciting agencies are more readily capable of coming into play; but they still do not enable us to decide whether the exciting cause of this delayed turbidity is in part the living element whose vitality and rate of reproduction has been lowered by the heat, or whether the effects are wholly attributable to the mere organic matter of the inoculating compound.

So far, therefore, we have concomitant variations which are equally compatible with either hypothesis. But it will be found that each of the three succeeding arguments speaks more and more plainly against the possible influence of the living element, and in favour of the action of the organic matter of the inoculating compound, as an efficient exciting cause of the delayed putrefactions occurring in the cases in question.

3. As stated in my last communication,[*] when single drops of slightly turbid infusions of hay or turnip previously heated to 140° F. are mounted and securely cemented as microscopical specimens, no increase of turbidity takes place, although drops of similar infusions heated only to 122° F. do notably increase in turbidity (owing to the multiplication of *Bacteria*) when mounted in a similar manner. Under such restrictive conditions as these, in fact, a drop of an inoculated and previously heated organic infusion behaves in precisely the same manner as a drop of a similarly treated ammonic-tartrate solution. In each case, when heated to 140° F., turbidity does not occur, apparently because there are no living units to multiply, and because in

---

[*] Extracts from a paper by Dr. H. Charlton Bastian, F.R.S., read before the Royal Society May 1, 1873.

[*] See NATURE, vol vii. p. 435.